

VISIT...

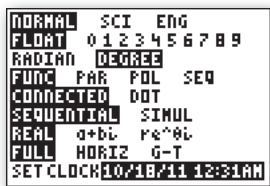
LANZAROTE
Caliente.COM

1 Useful hints

Setting the angle mode

When you reset your calculator (or change batteries) the default angle mode is radians. If you are working in degrees you will need to change this

How you do it...

Notes	You should press	You will see
To get to the correct menu	MODE	
To select degree mode	▼ ▼ ▶ ENTER	

Redoing calculations

If you made a mistake with the last line you typed in, press the ENTRY key (**2nd** **ENTER**).

The previous line is then returned and you can edit it before pressing **ENTER** again.

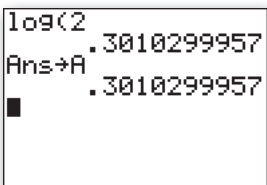
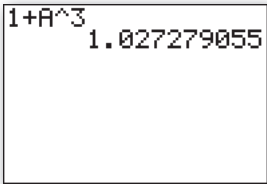
You can press ENTRY several times to go back several calculations.

Storing answers

The calculator can store numbers in its memory and use them in later calculations.

For example, to store $\log 2$ and use it in a calculation later:

How you do it...

Notes	You should press	You will see
Perform the calculation	LOG 2 ENTER	
Store in the variable 'A'	STO▶ ALPHA MATH (A) ENTER	
To use this in calculating $1 + (\log 2)^3$	1 + ALPHA MATH (A) ^ 3 ENTER	

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Working with fractions

Fractions have to be entered using the division sign and the plus sign.

For example, $\frac{2}{3}$ is entered as $\boxed{2} \boxed{\div} \boxed{3}$ and $4\frac{2}{3}$ as $\boxed{4} \boxed{+} \boxed{2} \boxed{\div} \boxed{3}$.

You can change the result of a calculation into a fraction and back into a decimal.

How you do it...

Notes	You should press	You will see
Perform the calculation	$\boxed{1} \boxed{+} \boxed{6} \boxed{\div} \boxed{2} \boxed{0}$ $\boxed{\text{ENTER}}$	
Convert the answer into a fraction	$\boxed{\text{MATH}}$ $\boxed{1} \boxed{(>\text{Frac})}$ $\boxed{\text{ENTER}}$	1+6/20 1.3 Ans►Frac 13/10 Ans►Dec 1.3
Convert back to a decimal	$\boxed{\text{MATH}}$ $\boxed{2} \boxed{(>\text{Dec})}$ $\boxed{\text{ENTER}}$	

2 Viewing graphs

Inputting a function

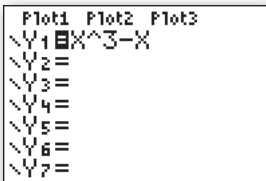
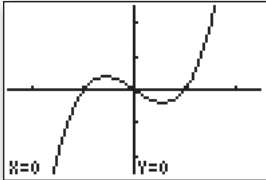
You will need...

- A function in the form $y = f(x)$

In our example...

- $y = x^3 - x$

How you do it...

Notes	You should press	You will see
To get to the correct menu	$\boxed{Y=}$	
Enter the function	$\boxed{X,T,\theta,n} \boxed{\wedge} \boxed{3} \boxed{\rightarrow} \boxed{-} \boxed{X,T,\theta,n} \boxed{\text{ENTER}}$	
Display the graph	$\boxed{\text{GRAPH}}$	

Setting which part of the graph you see

Whilst viewing the graph it is possible to zoom in and out (using the $\boxed{\text{ZOOM}}$ menu) but it is often a better idea to explicitly select the viewing window using the $\boxed{\text{WINDOW}}$ menu.

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

3 Finding some important functions

Finding $\binom{n}{r}$

For example: to find $\binom{7}{3}$.

How you do it...

Notes	You should press	You will see
Enter the calculation	7 MATH ▸ ▸ ▸ (PRB) 3 (nCr) 3 ENTER	7 nCr 3 35

Finding $x!$

For example: to find $9!$

How you do it...

Notes	You should press	You will see
Enter the calculation	9 MATH ▸ ▸ ▸ (PRB) 4 (!) ENTER	9! 362880

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Finding $|x|$

For example: to find $|-5|$.

How you do it...

Notes	You should press	You will see
Enter the calculation	MATH (NUM) 1 (abs) (-) 5) ENTER	abs(-5) 5

Finding $\sqrt[n]{x}$

For example: to find $\sqrt[4]{16}$.

How you do it...

Notes	You should press	You will see
Enter the calculation	4 MATH 5 ($\sqrt[n]{}$) 1 6 ENTER	4^{√16} 2

4 Analysing graphs

You will need...

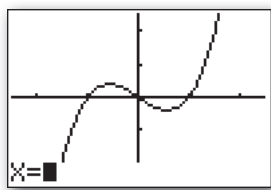
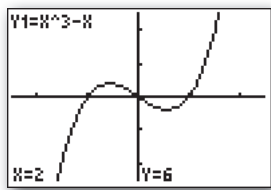
- A graph to analyse (see Calculator skills 2 for details of how to input this)
- An x -value where you want to know the y -value
- A y -value where you want to know the x -value
- Which type of turning point you are interested in

In our example...

- $y = x^3 - x$
- $x = 2$
- $y = 0$
- A maximum point

How to find coordinates of a point given an x -value

How you do it...

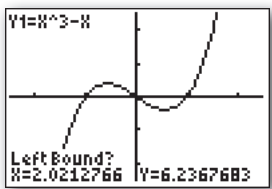
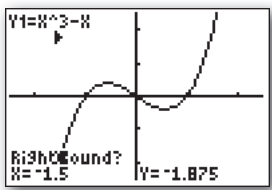
Notes	You should press	You will see
When viewing a graph (See Calculator skills 2 'Viewing graphs' if required)	2nd TRACE (CALC) 1 (value)	
Input the required x -value	2 ENTER	

What to write down...

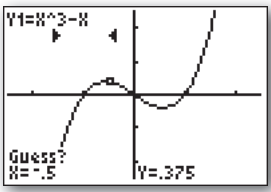
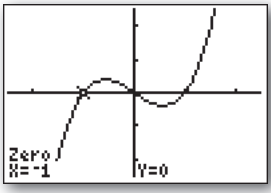
When $x = 2$, $y = 6$ (from GDC).

How to find coordinates of the points where $y = 0$ (zeros or roots)

How you do it...

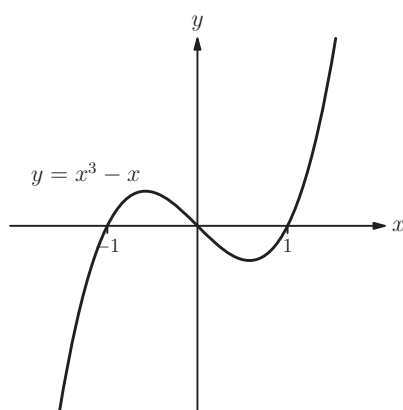
Notes	You should press	You will see
When viewing a graph (See Calculator skills 2 'Viewing graphs' if required)	2nd TRACE (CALC) 2 (zero)	
Move the cursor to the left of the required root, or enter a value below the required root	(-) 1 . 5 ENTER	

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Move the cursor to the right of the required root, or enter a value above the required root	$(-)$ 0 $.$ 5 ENTER	
	ENTER	
Repeat for other roots if required		

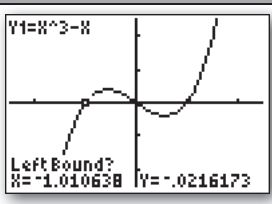
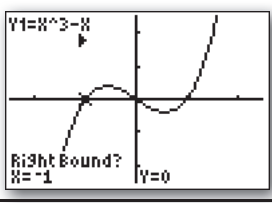
What to write down...

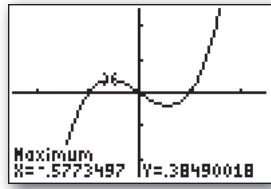
When $y = 0$, $x = -1, 0, 1$ (from GDC).



How to find the coordinates of a turning point

How you do it...

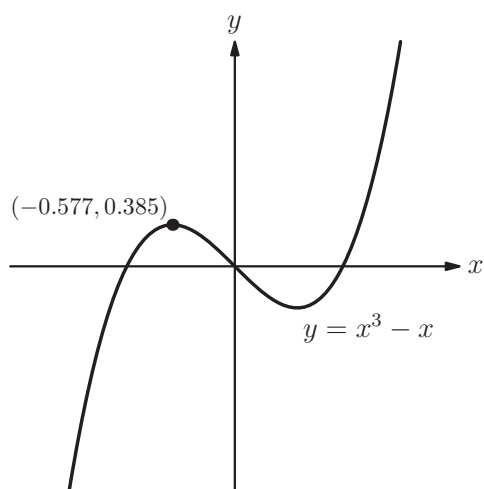
Notes	You should press	You will see
When viewing a graph (See Calculator skills 2 'Viewing graphs' if required)	2^{nd} TRACE (CALC) 4 (Maximum)	
Take the cursor to the left of the required turning point, or enter a value below it	$(-)$ 1 ENTER	

Take the cursor to the right of the turning point, or enter a value above it	0 ENTER ENTER	
Repeat for other turning points if required		

If you want to find minimum points, use 3:minimum instead.

What to write down...

Maximum occurs when $(-0.577, 0.385)$ (3SF from GDC).



5 Solving equations

Graphical solutions of equations

You will need...

- An equation to solve

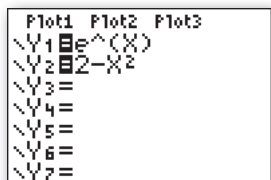
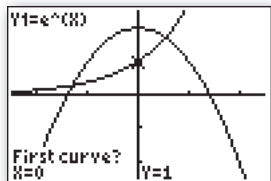
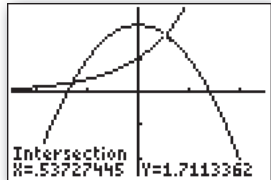
In our example...

- $e^x = 2 - x^2$

If you are trying to solve the equation $f(x) = g(x)$ plot the graphs $Y1 = f(x)$ and $Y2 = g(x)$.

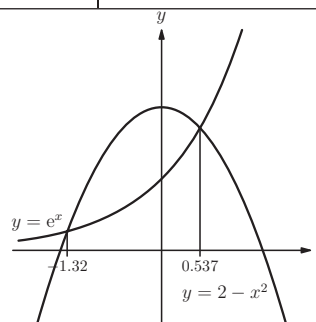
The solution to the original equation is the x -coordinate of the intersection of these two graphs.

How you do it...

Notes	You should press	You will see
Go to the graphing menu	$\boxed{Y=}$	
Put the left hand side into Y1	$\boxed{2nd} \boxed{LN} \boxed{X,T,\theta,n} \boxed{)} \boxed{ENTER}$	
Put the right hand side into Y2	$\boxed{2} \boxed{-} \boxed{X,T,\theta,n} \boxed{x^2} \boxed{ENTER}$	
Draw the graphs and look for intersections	$\boxed{GRAPH}$ $\boxed{2nd} \boxed{TRACE} \text{ (CALC)}$ $\boxed{5} \text{ (intersect)}$	
If there is more than one graph, use $\boxed{\uparrow}$ to move to the correct graph. If there is more than one intersection, move cursor closer to the required one.	$\boxed{ENTER}$ $\boxed{ENTER}$ $\boxed{ENTER}$	

What to write down...

From GDC $x = 0.537$ or $x = -1.32$ (3SF).



*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Numerical solutions of equations

You will need...

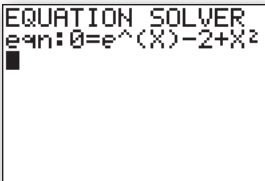
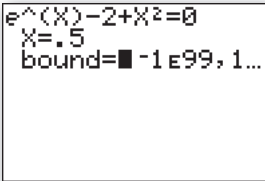
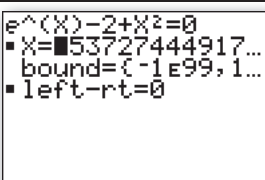
- An equation to solve, rearranged so that one side is zero
- An initial guess

In our example...

- $e^x - 2 + x^2 = 0$
- $x = 0$

The equation to be solved has to be rearranged so that one side is zero. This method starts from a 'guess' of the solution (which does not need to be particularly accurate) and it finds a single solution, usually the one closest to the guess. To find other solutions, other initial values must be tried.

How you do it...

Notes	You should press	You will see
Go to the equation solver and input the non-zero side of the equation	MATH 0 (Solver) 2nd LN X,T,Θ,n) - 2 + X,T,Θ,n x² ENTER	
Enter the initial guess. You can also set the bounds, but leaving them as -1×10^{99} and 1×10^{99} is fine	0 . 5 ENTER	
Move the cursor to the line with the guess and press SOLVE	↑ ALPHA ENTER (Solve)	

If a solution has been found the bottom line will say left-rt=0; if it doesn't it means that the calculator failed to find a solution within given bounds. You could try changing the initial guess or the bounds, but it is also possible that the equation has no solutions.

What to write down...

From GDC $x = 0.537$ (3SF) is one solution to the equation.

6 Solving polynomial and simultaneous equations

Solutions of polynomial equations

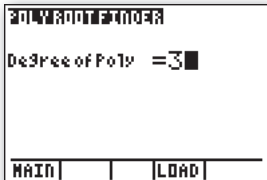
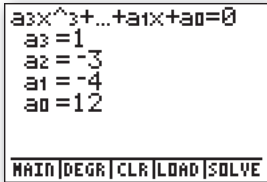
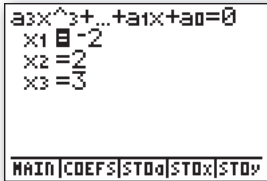
You will need...

- A polynomial equation in standard form
- The degree of the polynomial

How you do it...

In our example...

- $x^3 - 3x^2 - 4x + 12 = 0$
- 3 (cubic)

Notes	You should press	You will see
Go to PolySmlt 2 (APPLICATIONS) And select polynomial solver (POLY ROOT FINDER)	[APPS] [9] (↓ PlySmlt2) (POLY ROOT FINDER)	
Input the degree of the polynomial	[3] [ENTER]	
Input the coefficients	[1] [ENTER] [(-)] [3] [ENTER] [(-)] [4] [ENTER] [1] [2] [ENTER]	
Solve the equation	[GRAPH] (SOLVE)	

What to write down...

From GDC $x = -2, 2$ or 3 .

Storing the equation or the answers

You can store the coefficients (**[ZOOM]**) or the solutions (**[TRACE]**) in a list (select list name when prompted, for example **[2nd]** **[1]** for List1, and you can also store the polynomial (**[GRAPH]**) as an equation in a Y-variable for graphing.

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Solving linear simultaneous equations

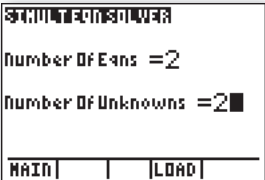
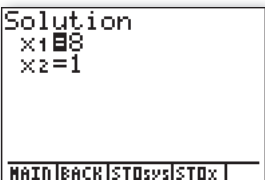
You will need...

- Simultaneous equations with all the unknowns on one side
- The number of unknown variables

In our example...

- $x + 2y = 10$
- $2x - 3y = 13$
- 2

How you do it...

Notes	You should press	You will see
Go to PolySmlt APP (you may need to press $\square$ several times) And select simultaneous equation solver	$\square$ (PolySmlt) $\square$ ENTER ENTER $\square$ (2:SIMULT EQN SOLVER) ENTER	
Enter the number of equations and number of unknown variables	2 ENTER 2 ENTER	
Input all the coefficients	1 ENTER 2 ENTER 1 0 ENTER 2 ENTER (-) 3 ENTER 1 3 ENTER	
Solve	GRAPH (SOLVE)	

What to write down...

From GDC $x = 8$ and $y = 1$.

Again, you can store the coefficients in a matrix (**ZOOM**) and the solution in a list (**TRACE**).

Non-linear simultaneous equations

To solve two non-linear simultaneous equations we rearrange both equations into the form $y = f(x)$ and then plot the graphs and find where they intersect as described in Calculator skills 5.

However, remember that now you need to give both the x - and the y -coordinates.

7 Functions

Sketching graphs of composite functions

You will need...

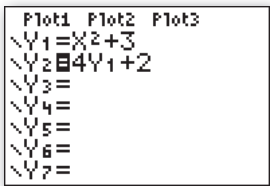
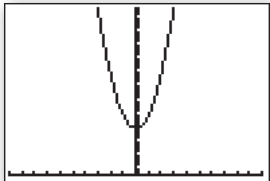
- an inner function
- an outer function

In our example...

- $f(x) = x^2 + 3$
- $g(x) = 4x + 2$

This will sketch the graph of $g(f(x)) = 4(x^2 + 3) + 2$.

How you do it...

Notes	You should press	You will see
Put the inner function into Y1	$\boxed{Y=}$ $\boxed{X,T,\Theta,n} \boxed{x^2} \boxed{+} \boxed{3}$ $\boxed{ENTER}$	
Put the outer function into Y2 using Y1 as the argument.	$\boxed{4}$ $\boxed{VARS}$ $\boxed{\blacktriangleright}$ (Y-VARS) $\boxed{1}$ (Function) $\boxed{1}$ (Y1) $\boxed{+} \boxed{2}$ $\boxed{ENTER}$	
Unselect Y1 so it is not displayed	$\boxed{\blacktriangleup}$ $\boxed{\blacktriangleup}$ $\boxed{\blacktriangleleft}$ $\boxed{ENTER}$	
Draw the graph	$\boxed{GRAPH}$	

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Sketching inverse functions

You will need...

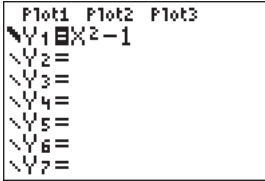
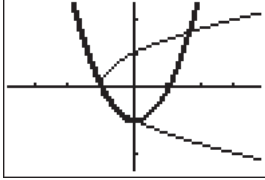
- The function which you would like to invert

Note that this sketches the inverse *relation*.

In our example

- $x^2 - 1$

How you do it...

Notes	You should press	You will see
Put the function into Y1	<code>Y=</code> <code>X,T,Θ,n</code> <code>x²</code> <code>-</code> <code>1</code>	
Change the line style so that the the original function is thicker by moving the left cursor to the line \ to the left of Y ₁ .	<code>◀</code> <code>◀</code> <code>◀</code> <code>◀</code> <code>◀</code> <code>◀</code> <code>ENTER</code>	
Draw the function and sketch the inverse function	<code>2nd</code> <code>PRGM</code> (DRAW) <code>8</code> (DrawInv) <code>VAR</code> <code>▶</code> (Y-VARS) <code>1</code> (Function) <code>1</code> (Y ₁) <code>ENTER</code>	

You may find that the choice of scale makes the function look less like a reflection than it should. `ZOOM` `5` (ZSquare) sets the axes to the same scale, which can be useful when looking at inverse functions.

8 Complex numbers

Doing complex arithmetic

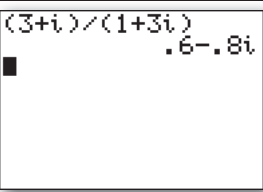
You will need...

- A calculation to perform

In our example...

$$\frac{3+i}{1+3i}$$

How you do it...

Notes	You should press	You will see
To change to complex mode	MODE ▼ ▼ ▼ ▼ ▼ ▼ ▶ (a+bi) ENTER	
(i is found using 2nd .)	2nd MODE (QUIT) (3 + 2nd . (i)) ÷ (1 + 3 2nd . (i)) ENTER	

What to write down...

From GDC: $\frac{3+i}{1+3i} = 0.6 - 0.8i$.

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Finding the modulus and argument of complex numbers

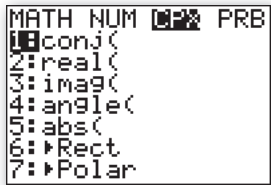
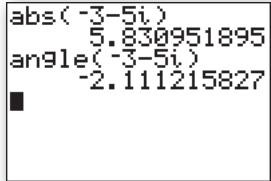
You will need...

- A complex number

In our example...

- $-3 - 5i$.

How you do it...

Notes	You should press	You will see
(Make sure your calculator is in radians, see Calculator skills 1 if required). Access the CPX menu	MATH ▸ ▸ (CPX)	
The modulus is called 'abs'	5 (abs) (-) 3 = 5 2nd . (i)) ENTER	
To find the argument follow a similar procedure. The argument is called 'angle'.	MATH (QUIT) ▸ ▸ (CPX) 4 (angle) (-) 3 = 5 2nd . (i)) ENTER	

What to write down...

From GDC: $|-3 - 5i| = 5.83, \arg(-3 - 5i) = -2.11$ (3SF).

Doing calculations in modulus-argument form

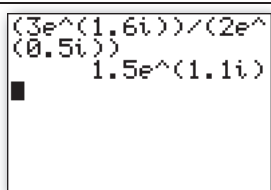
You will need...

- A calculation to perform

In our example...

$$\frac{3e^{1.6i}}{2e^{0.5i}}$$

How you do it...

Notes	You should press	You will see
(Make sure your calculator is in radians, see Calculator skills 1 if required) To change to modulus-argument mode	MODE ▼ ▼ ▼ ▼ ▼ ▼ ▶ ▶ $(re^{\theta i})$ ENTER 2nd MODE (QUIT)	
Enter the calculation	(3 2nd LN (e^x) 1 . 6 2nd . (i)) ▶) ÷ (2 2nd LN (e^x) (0 . 5 2nd . (i)) ▶) ENTER	

What to write down...

From GDC: $\frac{3e^{1.6i}}{2e^{0.5i}} = 1.5e^{1.1i}$.

Converting the answer to Cartesian form

You will need...

- The answer from a previous calculation

In our example...

- $1.5e^{1.1i}$

How you do it...

Notes	You should press	You will see
Use previous answer	2nd (-) (ANS)	
Choose correct option from CPX menu	MATH ▸ ▸ (CPX) 6 (>Rect) ENTER	MATH NUM CPX PRB 1: conj(2: real(3: imag(4: angle(5: abs(6: ▸ Rect 7: ▸ Polar
Move cursor right to see the whole answer	▸ ▸ ▸	$(3e^{(1.6i)}) / (2e^{(0.5i)})$ $1.5e^{(1.1i)}$ Ans ▸ Rect ...3941821+1.3368...

What to write down...

From GDC: $1.5e^{1.1i} = 0.680 + 1.34i$ (3SF).

You can also convert back to the modulus-argument form by using option 7(>Polar).

9 Differentiation

Finding the gradient of a tangent at a point

You will need...

- The equation of a curve
- The x -coordinate of the point of interest

In our example...

- $y = x \sin x$
- $x = 2$

How you do it...

Notes	You should press		You will see
Access the MATH menu and select 'nDeriv' option	MATH 8	(nDeriv)	
Use the syntax: nDeriv(function, X,x-value)	X,T,Θ,n SIN X,T,Θ,n) , X,T,Θ,n , 2) ENTER		nDeriv(Xsin(X),X ,2) .0770034378

What to write down...

Gradient of $y = x \sin x$ when $x = 2$ is 0.0770 (3 SF) (From GDC).

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Finding the equation of the tangent at a point

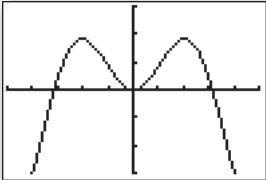
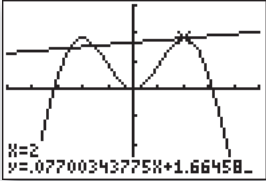
You will need...

- The equation of a curve
- The x -coordinate of the point of interest

In our example...

- $y = x \sin x$
- $x = 2$

How you do it...

Notes	You should press	You will see
Sketch the curve, making sure that the viewing window includes the point of interest	See Calculator skills 2 'Viewing graphs'	
From the DRAW menu, select Tangent and type in the x-value	<code>2nd</code> <code>PRGM</code> (DRAW) <code>5</code> (Tangent) <code>2</code> <code>ENTER</code>	

What to write down...

From GDC, the equation of the tangent to $y = x \sin x$ at $x = 2$ is $y = 0.770x + 1.66$.

Sketching the derivative function

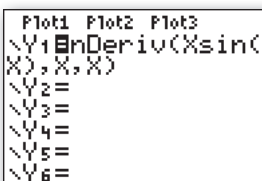
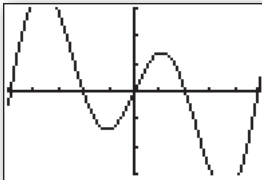
You will need...

- A function

In our example...

- $y = x \sin x$

How you do it...

Notes	You should press	You will see
Access the Y= menu	<code>Y=</code>	
Follow the process above with the x value replaced by the variable X	<code>MATH</code> <code>8</code> (nDeriv) <code>X,T,Θ,n</code> <code>SIN</code> <code>X,T,Θ,n</code> <code>)</code> <code>,</code> <code>X,T,Θ,n</code> <code>,</code> <code>X,T,Θ,n</code> <code>)</code>	
Sketch the graph	<code>GRAPH</code>	

Finding the value of the second derivative at a point

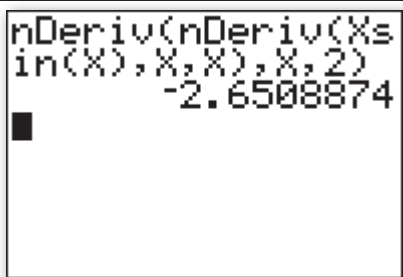
You will need...

- The equation of a curve
- The x -coordinate of the point of interest

In our example...

- $y = x \sin x$
- $x = 2$

How you do it...

Notes	You should press	You will see
Access the MATH menu and select 'nDeriv' option	MATH 8 (nDeriv)	
Use nDeriv with the derivative as the function: nDeriv(nDeriv(function,X,X), X,x-value)	MATH 8 (nDeriv) X,T,Θ,n SIN X,T,Θ,n) , X,T,Θ,n , X,T,Θ,n) , X,T,Θ,n) , 2) ENTER	

What to write down...

From GDC : for $f(x) = x \sin x$, $f''(2) = -2.65(3 \text{ SF})$.

10 Integration

Finding a definite integral

You will need...

- A function to integrate
- The limits of the integral

In our example...

- e^{x^2}
- $x=0$ to $x=1$

How you do it...

Notes	You should press	You will see
Go to MATH menu and select the fnInt option	MATH 9 ($\downarrow$ fnInt)	
Use syntax: fnInt(function,X,lower_limit,upper_limit)	2nd LN (e^{x^2}) X,T,Θ,η x^2) , X,T,Θ,η , 0 , 1) ENTER	fnInt($e^{(X^2)}$,X,0,1) 1.462651746

You can also find the area under a graph when plotting it using

2nd **TRACE** **(CALC)** **7** ($\int f(x) dx$)

and typing in the limits. This has the advantage that the associated area is shaded on the graph.

What to write down...

$$\int_0^1 e^{x^2} dx = 1.46 \text{ (3SF from GDC).}$$

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

11 Working with lists

Entering numbers into lists

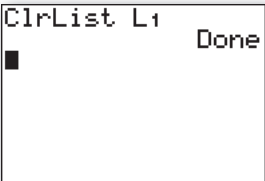
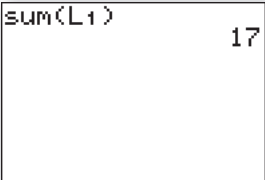
You will need...

- Numbers to enter into the list
- The name of the list you want to use

In our example...

- 1, 3, 5, 8
- L^1

How you do it...

Notes	You should press	You will see
Clear the list of any previous content	STAT 4 (ClrList) 2nd 1 (L_1) ENTER	
Go to the correct list	STAT 1 (Edit)	
Enter the numbers	1 ENTER 3 ENTER 5 ...	

Create new list from an old list

You will need...

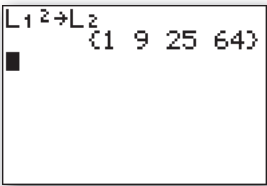
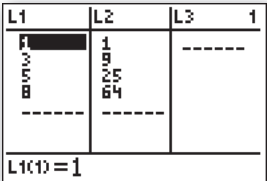
- A list of numbers
- The rule to generate new numbers
- A list to store new numbers

In our example...

- L^1
- $y_i = x_i^2$
- L^2

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

How you do it...

Notes	You should press	You will see
Perform the calculation and store numbers in the list	$\boxed{2\text{nd}} \boxed{1} (L_1)$ $\boxed{x^2}$ $\boxed{\text{STO}} \rightarrow$ $\boxed{2\text{nd}} \boxed{2} (L_2)$ $\boxed{\text{ENTER}}$	
View the lists	$\boxed{\text{STAT}} \boxed{1} (\text{Edit})$	

Performing calculations with a single list

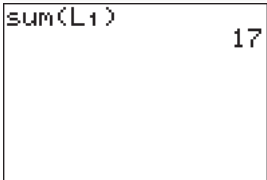
You will need...

- A list of numbers
- The operation to perform

In our example...

- L_1
- add all numbers

How you do it...

Notes	You should press	You will see
To get to the correct menu	$\boxed{2\text{nd}} \boxed{\text{STAT}} (\text{LIST})$ $\boxed{\blacktriangleright}$ $\boxed{\blacktriangleright} (\text{MATH})$	
Select 'sum' and the required list	$\boxed{5} (\text{sum})$ $\boxed{2\text{nd}} \boxed{1} (L_1)$ $\boxed{)}$ $\boxed{\text{ENTER}}$	

What to write down...

From GDC, $\sum x_i = 17$.

You can use the same menu to find the mean, median, standard deviation and variance of the numbers in the list, as an alternative to using the STAT menu (see 12 Calculator skills 'Descriptive statistics').

12 Descriptive statistics

Finding statistics from a list

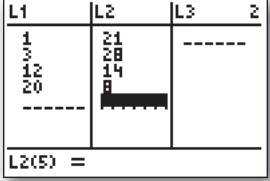
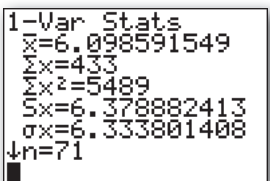
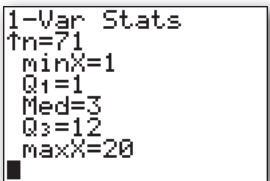
You will need...

- A list of data values
- (Optional) a list of data frequencies

In our example...

- In List L1: 1, 3, 12, 20
- In List L2: 21, 28, 14, 8

How you do it...

Notes	You should press	You will see
Go to the STAT menu and enter the lists	See Calculator skills 11	
Return to the main screen and access the STAT menu	<code>2nd</code> <code>MODE</code> (QUIT) <code>STAT</code> <code>▸</code> (CALC) <code>1</code> (1-Var Stats)	
Say which list(s) the data is in; if all frequencies are 1, the second list is not needed.	<code>2nd</code> <code>1</code> (L_1) <code>,</code> <code>2nd</code> <code>2</code> (L_2)	
	<code>ENTER</code>	
Scroll down to see further information	<code>▼</code> <code>▼</code> <code>▼</code> <code>▼</code> <code>▼</code>	

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Interpreting the Information...

Symbol	Meaning	Notes
$\bar{x}$	Mean of the data	
$\sum x$	Sum of the data	
$\sum x^2$	Sum of the squares of the data	
S_x	Estimate of the standard deviation of the population	This is the 'unbiased estimate'
σ_x	Standard deviation of the data	
n	Number of data items	Useful for checking that data has been correctly entered.
$\min X$	Smallest data value	
Q1	Lower quartile	
Med	Median	
Q3	Upper quartile	
$\max X$	Largest data value	

Each of these variables can be accessed for calculations by going to **[VARS]** **[5]** (Statistics).

13 Discrete probability distributions

Finding the probability of a single outcome

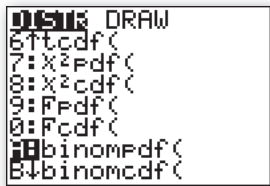
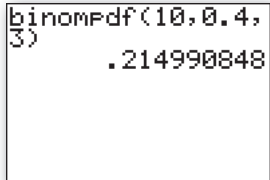
You will need...

- The distribution, including relevant parameters
- The outcome whose probability you want to find

In our example...

- $X \sim B(10, 0.4)$
- $P(X = 3)$

How you do it...

Notes	You should press	You will see
To get to the correct menu (binompdf) (press $\blacktriangledown$ until you get to the correct line)	$\boxed{2\text{nd}} \boxed{\text{VARS}} \text{ (DISTR)}$ $\boxed{\blacktriangledown}$ $\boxed{\text{ENTER}}$	
Enter the parameters	$\boxed{1} \boxed{0} \boxed{,}$ $\boxed{0} \boxed{.} \boxed{4} \boxed{,}$ $\boxed{3} \boxed{)}$ $\boxed{\text{ENTER}}$	

What to write down...

$X \sim B(10, 0.4)$.

From GDC $P(X = 3) = 0.215$ (3SF).

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Finding a cumulative probability

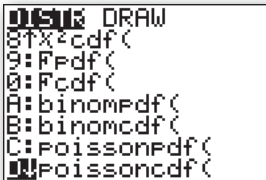
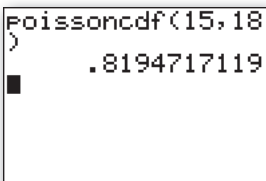
You will need...

- The distribution, including relevant parameters
- Cumulative probability in the form $P(X \leq k)$

In our example...

- $X \sim \text{Po}(15)$
- $P(X \leq 18)$

How you do it...

Notes	You should press	You will see
To get to the correct menu (DISTR) (press $\blacktriangledown$ until you get to the correct line)	$\boxed{2\text{nd}} \boxed{\text{VARS}}$ (poissoncdf) $\blacktriangledown$ $\boxed{\text{ENTER}}$	
Enter the parameters	$\boxed{1} \boxed{5} \boxed{.}$ $\boxed{1} \boxed{8} \boxed{)}$ $\boxed{\text{ENTER}}$	

What to write down...

$X \sim \text{Po}(15)$.

From GDC $P(X \leq 18) = 0.819$ (3SF).

Finding many probabilities

This is useful when finding the mode of a discrete distribution.

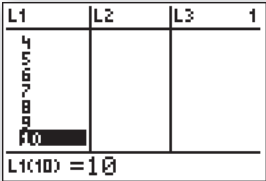
You will need...

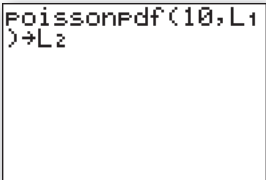
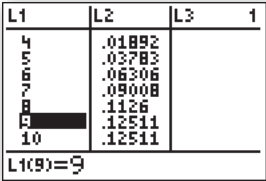
- The distribution, including relevant parameters
- The range of outcomes whose probabilities you want to find

In our example...

- $X \sim \text{Po}(8)$
- $1 \leq X \leq 10$

How you do it...

Notes	You should press	You will see
Enter the required values of X into a list	$\boxed{\text{STAT}} \boxed{1}$ (Edit) $\boxed{1}$ $\boxed{\text{ENTER}}$ $\boxed{2}$ $\boxed{\text{ENTER}}$... $\boxed{1}$ $\boxed{0}$ $\boxed{\text{ENTER}}$	

Go back to the main screen. Calculate probabilities (poissonpdf) and store in another list	$\boxed{2\text{nd}} \boxed{\text{MODE}} \text{ (QUIT)}$ $\boxed{2\text{nd}} \boxed{\text{VARS}} \text{ (DISTR)}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow}$ $\boxed{\uparrow} \text{ (poissonpdf)}$ $\boxed{\text{ENTER}}$ $\boxed{8}$ $\boxed{,}$ $\boxed{2\text{nd}} \boxed{1} \text{ (L}_1\text{)}$ $\boxed{)}$ $\boxed{\text{STO} \rightarrow}$ $\boxed{2\text{nd}} \boxed{2} \text{ (L}_2\text{)}$ $\boxed{\text{ENTER}}$	
You can see the probabilities in list L2	$\boxed{\text{STAT}} \boxed{1} \text{ (EDIT)}$	

Summary of syntax

Distribution	Probability to find	Syntax
$X \sim B(n, p)$	$P(X = k)$	binompdf(n,p,k)
$X \sim B(n, p)$	$P(X \leq k)$	binomcdf(n,p,k)
$X \sim \text{Po}(m)$	$P(X = k)$	poisspdf(m,k)
$X \sim \text{Po}(m)$	$P(X \leq k)$	poissoncdf(m,k)

14 Normal distribution

Finding a probability

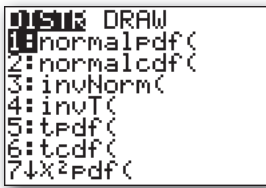
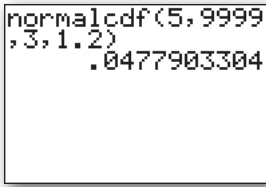
You will need...

- The values of μ and σ
- The probability you wish to find

In our example...

- $\mu = 3, \sigma = 1.2$
- $P(X \geq 5)$

How you do it...

Notes		You will see
To get to the correct menu	2nd VAR (DISTR)	
Select cumulative normal distribution	2 (normalcdf)	
Enter parameters (in this case, enter a large number for the upper bound): normalcdf(lower,upper,mean,SD)	5 , 9 9 9 9 , 3 , 1 . 2) ENTER	

What to write down...

$$X \sim N(3, 1.2^2).$$

From GDC $P(X \leq 5) = 0.0478$ (3SF).

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Producing a shaded normal distribution diagram

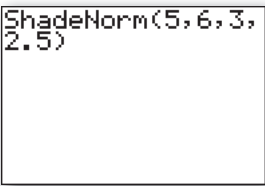
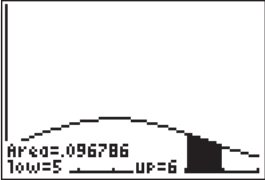
You will need...

- The parameters of the normal distribution
- The range of values of X

In our example...

- $X \sim N(3, 2.5^2)$
- $P(5 \leq X \leq 6)$

How you do it...

Notes	You should press	You will see
To get to the correct menu	2nd VARS (DISTR) ▸ (DRAW) 1 (ShadeNorm)	
Enter the parameters	5 , 6 , 3 , 2 . 5) ENTER	 

Finding the boundary

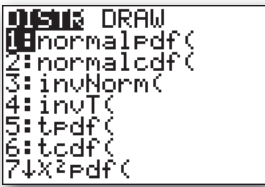
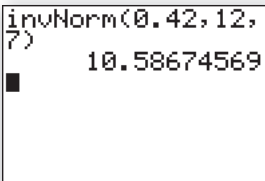
You will need...

- The parameters of the normal distribution
- Cumulative probability in the form $P(X \leq k)$

In our example...

- $X \sim N(12, 7^2)$
- $P(X \leq k) = 0.42$

How you do it...

Notes	You should press	You will see
To get to the correct menu	<code>2nd</code> <code>VAR</code> (DISTR) <code>3</code> (invNorm)	
Enter parameters: invNorm(upper, mean, SD)	<code>0</code> <code>.</code> <code>4</code> <code>2</code> <code>,</code> <code>1</code> <code>2</code> <code>,</code> <code>7</code> <code>)</code> <code>ENTER</code>	

What to write down...

$X \sim N(12, 7^2)$.

$P(X \leq k) = 0.42 \Rightarrow k = 10.6$ (3 SF from GDC).

To find the lower bound

If given $P(X \geq k) = 0.6$, use the above method with $P(X \leq k) = 0.4$.

15 Systems of simultaneous equations

You will need...

- A system of equations

In our example...

- $x + y + z = 2$
 $2x + 2y + 2z = 4$
 $x + 2y + z = 2$

To put this into the calculator we need to rewrite it as a table of all of the numbers involved, called an augmented matrix:

$$\begin{pmatrix} 1 & 1 & 1 & 2 \\ 2 & 2 & 2 & 4 \\ 1 & 2 & 1 & 2 \end{pmatrix}$$

How you do it...

Notes	You should press	You will see
Go to the matrix menu	2nd [x⁻¹] (MATRX)	
Edit matrix A	[>] [>] (EDIT) ENTER	
Change the size of the matrix to 3×4	3 ENTER 4 ENTER	
Input the coefficients	1 ENTER 1 ENTER 1 ENTER 2 ENTER 2 ENTER 2 ENTER 2 ENTER 4 ENTER 1 ENTER 2 ENTER 1 ENTER 2 ENTER	

*These instructions were written based on the TEXAS model T1-84 Plus Silver Edition and might not be true for other models. If in doubt, consult your calculator's manual.

Solve the equations	$\boxed{2\text{nd}} \boxed{\text{MODE}} \text{ (Quit)}$ $\boxed{2\text{nd}} \boxed{x^{-1}}$ $\boxed{\blacktriangleright} \text{ (MATRX)}$ $\boxed{\text{ALPHA}} \boxed{\text{MATH}} \text{ (ref)}$ $\boxed{2\text{nd}} \boxed{x^{-1}} \text{ (MATRIX)}$ $\boxed{1} \text{ (A)}$ $\boxed{)}$ $\boxed{\text{ENTER}}$	$\text{ref}([A])$ $\begin{bmatrix} 1 & 1 & 1 & 2 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$
---------------------	---	--

What to write down...

The system of equations can be written as:

$$x + y + z = 2$$

$$y = 0$$

$$0 = 0.$$

This is a consistent set of equations with an infinite number of solutions of the form:

$$y = 0, z = t, x = 2 - t.$$